:CURIT

AD-A258 677

:NTATION PAGE

Form Approved
OMB No 0704-0188
Exp Date Jun 30, 1986

a. REPO Inclassified	1b. RESTRICTIVE MARKINGS None
a. SECURITY CLASSIFICATION AUTHORITY I/A	3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution A. Unlimited
b. DECLASSIFICATION/DOWNGRADING SCHEDULE I/A	
. PERFORMING ORGANIZATION REPORT NUMBER(S))ODPOPHMTR/AYD 92-022	5. MONITORING ORGANIZATION REPORT NUMBER(S) None
6a. NAME OF PERFORMING ORGANIZATION Packaging Division	6b. OFFICE SYMBOL (If applicable) SMCAR-AEP
7a. NAME OF MONITORING ORGANIZATION None	
6c. ADDRESS (City, State, and ZIP Code) J.S. Army Armament Research, Development & Engineering Center, Picatinny Arsenal, NJ 07806-5000	7b. ADDRESS (City, State, and ZIP Code) None
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Same as 6a	8b. OFFICE SYMBOL (If applicable) SMCAR-AEP
9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code) same as 6a	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO	WORK UNIT ACCESSION NO

DTIC
ELECTE
DEC02 1992
S E D

11. TITLE (Include Security Classification)
Performance Oriented Packaging (POP) Testing of Fiber Drum DOT-21C115 for WC 750 Propellant for 7.62mm Ammunition

12. PERSONAL AUTHOR(S)
Edgardo B. Silvestre

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM _____ TO _____	921130	

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	1. Performance Oriented Packaging 4. Packaging 2. Propellant 3. Fiber Drum DOT-21C115

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report covers the POP testing of fiber drum DOT-21C115 used as shipping container for 7.62mm cartridges propellant WC 750. Method of packing is consistent with Olin Defense Systems Group (ODSG) drawing D-12.6-4-004 revision 5. The fiber drum contains solid propellant in a moisture-bag. Tests were conducted using drums containing additional weights to ensure that tested weight is higher than heaviest pack to ensure safe shipment.

92-30578

92

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	Unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL
Edgardo B. Silvestre	(201) 724-2173	SMCAR-AEP

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF COLOR PAGES WHICH DO NOT REPRODUCE LEGIBLY ON BLACK AND WHITE MICROFICHE.

DODPOPHMTR/AYD 92-022

PERFORMANCE ORIENTED PACKAGING TESTING

OF

FIBER DRUM DOT-21C115 FOR WC 750
PROPELLANT FOR 7.62MM AMMUNITION

FOR

PACKING GROUP II
SOLID HAZARDOUS MATERIALS

Author:

EDGARDO B. SILVESTRE
PACKAGING TECHNOLOGIST

Performing Activity

SMCAR-AEP
U.S. Army Armament Research, Development
and Engineering Center
Picatinny Arsenal, New Jersey 07806-5000

November 1992

FINAL

DODPOPHMTR/AYD 92-022

PREPARED BY:

Edgardo B. Silvestre

Edgardo B. Silvestre
Packaging Technologist

REVIEWED BY:

Frank Chan

for James F. Zoll
Project Leader

REVIEWED BY:

Eugene Farrell

for James Frankovic
Supervisory Packaging Engineer

APPROVED BY:

Robert J. Kuper

Robert J. Kuper
Chief, Packaging Division

INTRODUCTION

The Department of Transportation (DOT) per CFR 49, Parts 100-179, dated 1 Oct 91, requires that hazardous materials should be packed in a container that passes the Performance Oriented Packaging (POP) tests.

The fiber drum DOT-21C115 is used as the shipping container for WC 750 propellant for 7.62mm ammunition. This drum contains solid propellant in a moisture-barrier bag.

POP tests were conducted using drums containing additional weight to ensure that the tested weight is higher than the heaviest pack. The tests were conducted in accordance with the referenced sections of CFR 49 and are valid only when propellant is packed in the fiber drum DOT-21C115 by Olin for the DOD. The DOT-21C115 drum authorized by this report is manufactured by SONOCO Fiber Drum, Inc. of Marietta, Georgia.

TEST PERFORMED

1. Drop Test (Fig. 1 & 3)

Section 178.603 of CFR 49 specifies that three drums each should be used for each drop orientation. Six (6) drums were used for two different orientations.

Six drums each were dropped from a height of 1.2 meters (3.9 ft) in the following orientations: three drums were dropped on the bottom edge and three drums were dropped on the top edge where the closure is located. The closure represents the weakest point as specified in CFR 49.

2. Vibration Test (Fig. 6 & 7)

Three (3) drums were placed on the vibrating platform and vibrated for a duration of one hour. The drums were unrestrained except horizontally to prevent it from falling off of the platform. The peak-to-peak displacement was one inch and the frequency was 291 Hz. This frequency was sufficient enough to allow the package to become completely airborne, enabling a 1/16 inch (.16 cm) thick piece of strapping material to be slid underneath the package during testing.

3. Stacking Test (Fig. 8)

Section 178.606 of CFR 49 requires that the minimum height of the stack including the test sample must be 3.0 meters (10 ft). Three test samples are required.

A 3.0 meter stack height of samples is equivalent to 641 lbs. (291 kg) of stack weight. Three different test samples were each subjected to a stack weight of 641 lbs for a period of 24 hours. The samples then were inspected and examined for any damage and distortion.

PASS/FAIL (DOT CRITERIA)

A package for explosives is considered to successfully pass the drop tests if for each sample tested, no rupture of the packaging occurs.

A packaging passes the vibration test if there is no rupture or leakage from any of the packages.

A test sample passes the stacking test when no test sample leaks. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength or cause instability in stacks of packages.

TEST RESULTS

1. Drop Test - Result (Fig. 2, 3 & 5): Pass - no spillage.

All six drops on two orientations deformed the edge of the drums. However, there were no ruptures of any of the drums and there were no spillage of contents.

2. Vibration Test - Result: Pass - no spillage or damage.

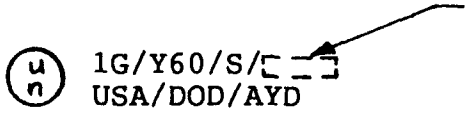
All three drums were removed from the platform after one hour vibration. Each of the boxes was turned on its side and inspected for any damage and leakage. The packages were all tightly intact and showed no evidence of deterioration.

3. Stacking Test - Result: Pass - no evidence of distortion.

The stacking test was performed with the use of a forklift to apply a dead load of 641 pounds on top of each of the three drums. Each of the drums adequately supported the applied load. No evidence of drum distortion was noted.

REMARK

Based on the successful POP testing outlined in this report, the following POP symbol shall be applied to drums manufactured in accordance with Olin Defense Systems Group (ODSG) drawing D-12.6-4-004 when used to package the NSN's listed in the Table.



REFERENCE MATERIAL

1. Federal Register, "49 CFR Part 107, 1 Oct 91"

TEST DATA

DATA:

Container (Outer):

Type: Drum
ODSG Drawing No. D-12.6-4-004
UN Code: 1G
Manufacturer: Sonoco Fiber Drum, Inc. Marietta, GA
Material: Fiber
Capacity: 54.5 liters
Dimensions:

Inside: Diameter = 35.56 cm (14 in.)
Height = 54.93 cm (21 5/8 in.)

Outside: Diameter = 36.20 cm (14 1/4 in.)
Height = 56.20 cm (22 1/8 in.)

Weight: 2.3 kg (5.0 lbs)

PRODUCT(S):

Identification No.: See Table
UN Packing Group: II
Physical State: Solid
Amount per Container: See Table

TEST MATERIALS:

Name: Sand
Physical State: Solid
Size: Granulated Sand
Quantity: 140 lbs
Dunnage: Polyethylene foam per PPP-C-1752
Gross Weight: 145 lbs (66 kg)

TABLE

DODIC OR NALC	NSN	HM ITEM	TYPE	HAZARD CLASS	UN NO.	#/CNTR	WT KG
-	1376-Ø1-263-65Ø2	Propellant	-	1.3C	Ø161	132	6Ø
-	1376-Ø1-362-65Ø3	Propellant	-	1.3C	Ø161	132	6Ø

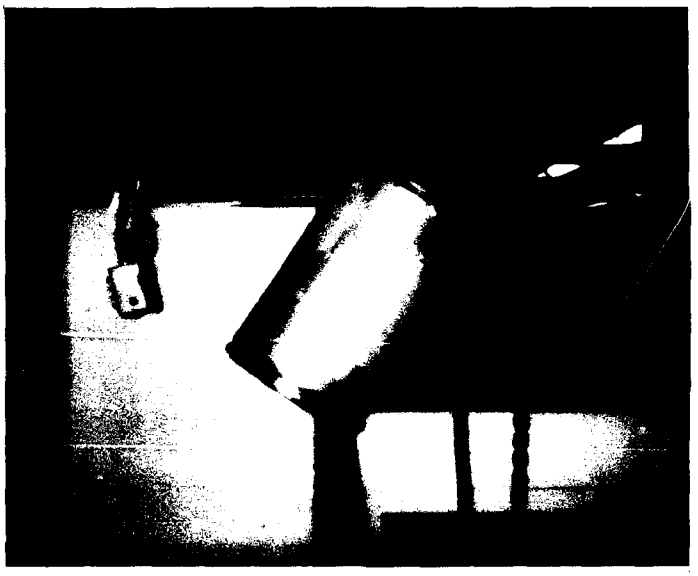


Fig. 1. Drop Test on
Top Edge (closure)

Fig. 2. Result of Drop Test
on Top Edge

Fig. 3. Drop Test on
Bottom Edge

Fig. 4. Result of Drop Test
on Bottom Edge

Fig. 5. Results of Drop Test
Left: Bottom Edge
Right: Top Edge (closure)

Fig. 6. Vibration Test
Front View

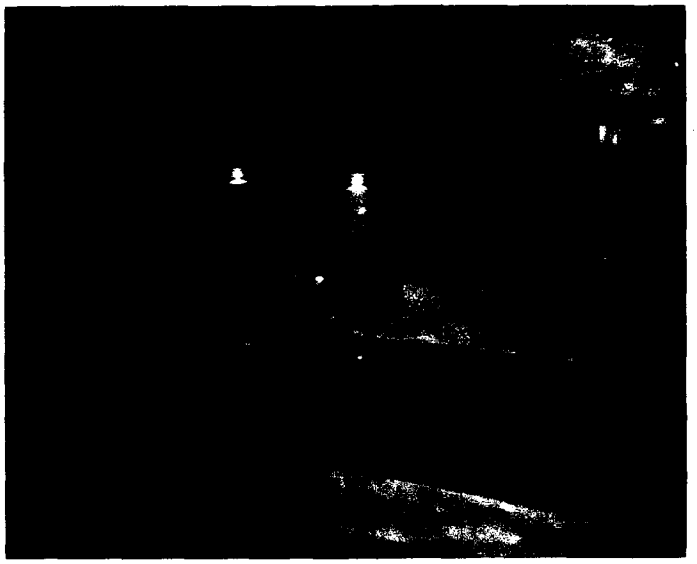


Fig. 7. Vibration Test
Side View

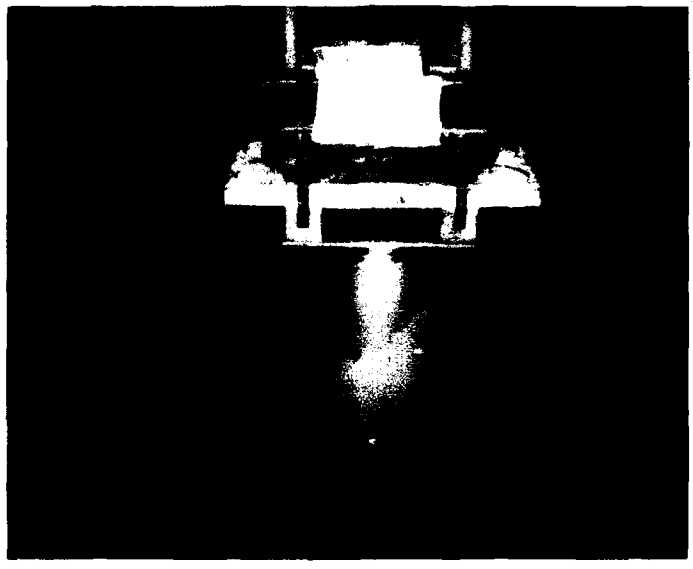


Fig. 8. Stack Test